

**UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE**

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site Name: Limestone Hills

Site ID: R042XB021NM

Major Land Resource Area: 042 - Southern Desertic Basins, Plains, and Mountains

Physiographic Features

This site occurs as a complex of soils, rock, aspect, and directions of slope. It is characterized by rolling to steep hills and mountain footslopes. Slopes range in extreme from 15 to 75 percent. and average about 25 percent. Elevations range from 4,000 to 5,300 feet.

Land Form: (1) Hill

(2) Mountain slope

	<u>Minimum</u>	<u>Maximum</u>
<u>Elevation (feet):</u>	4000	5300
<u>Slope (percent):</u>	15	75
<u>Water Table Depth (inches):</u>	N/A	N/A
<u>Flooding:</u>		
Frequency:	None	None
Duration:	None	None
<u>Ponding:</u>		
Depth (inches):	N/A	N/A
Frequency:	None	None
Duration:	None	None
<u>Runoff Class:</u>	High	Very high
<u>Aspect:</u>		

Climatic Features

Annual average precipitation ranges from 8 to 10.5 inches. Wide fluctuations from year to year are common, ranging from a low of about 2 inches to a high of over 20 inches. At least one-half of the annual precipitation comes in the form of rainfall during July, August, and September. Precipitation in the form of snow or sleet averages less than 4 inches annually. The average annual air temperature is about 61 degrees F. Summer maximums usually exceed 100 degrees F., and winter minimums can go below zero. The average frost-free season exceeds 200 days and extends from April 1 to November 1. Both temperature regime and rainfall distribution favor warm-season perennial plants on this site. Spring moisture conditions are only occasionally adequate to cause significant growth during this period of the year. High winds from the west and southwest are common from March to June, which further tends to create poor soil moisture conditions in the springtime.

	<u>Minimum</u>	<u>Maximum</u>
<u>Frost-free period (days):</u>	179	212
<u>Freeze-free period (days):</u>	200	233
<u>Mean annual precipitation (inches):</u>	8.0	10.5

Monthly precipitation (inches) and temperature (°F):

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
Precip. Min.	0.37	0.36	0.23	0.18	0.29	0.57	1.42	1.92	1.53	1.01	0.48	0.57
Precip. Max.	0.54	0.39	0.27	0.36	0.45	0.64	1.9	2.2	1.66	1.07	0.58	0.78
Temp. Min.	20.8	25.5	31.2	38.0	46.4	54.3	95.5	92.7	87.5	78.7	67.2	58.8
Temp. Max.	58.1	63.8	71.0	79.3	87.4	96.4	61.1	59.1	51.5	39.8	28.8	22.3

Climate Stations:

- (1) NM3855, Hatch. Period of record 1961 - 1990
(2) NM8387, Socorro. Period of record 1961 - 1990

Influencing Water Features

This site is not influenced by water from wetlands or streams.

<u>Wetland Description:</u> (Cowardin System)	<u>System</u>	<u>Subsystem</u>	<u>Class</u>
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Representative Soil Features

The soils are shallow and well drained. Typically, they are loamy to clayey and usually gravelly and/or stony underlain by limestone or calcareous silt stone. They are usually calcareous throughout the profile. They have moderate to moderately slow permeability. Slopes average more than 15 %. They usually occur on rolling to steep hills, mountain foot slopes on moderate to steep slopes.

Predominant Parent Materials:

Kind: Marine deposits

Origin: Limestone

Surface Texture: (1) Gravelly Loam
(2) Stony Clay loam
(3) Clay

Subsurface Texture Group: Loamy

Surface Fragments <=3" (% Cover): 15

Surface Fragments > 3" (% Cover): 30

Subsurface Fragments <=3" (% Volume): 30

Subsurface Fragments > 3" (% Cover): 20

Drainage Class: Well drained To Somewhat excessively drained

Permeability Class: Slow To Very slow

	<u>Minimum</u>	<u>Maximum</u>
<u>Depth (inches):</u>	4	60
<u>Electrical Conductivity (mmhos/cm):</u>	0	2
<u>Sodium Absorption Ratio:</u>	N/A	N/A
<u>Calcium Carbonate Equivalent (percent):</u>	N/A	N/A
<u>Soil Reaction (1:1 Water):</u>	7.9	8.4
<u>Soil Reaction (0.01M CaCl₂):</u>	N/A	N/A
<u>Available Water Capacity (inches):</u>	0.0	1.0

Plant Communities

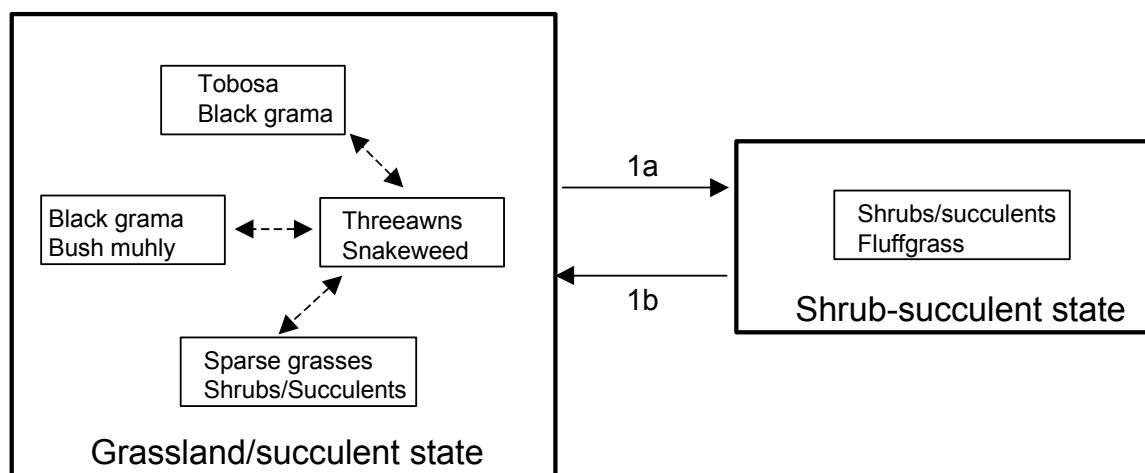
Ecological Dynamics of the Site

Overview

This site frequently intergrades with gravelly and hills sites. This site tends to occur at or approaching transitions to higher-elevation land resource units (e.g. CP-4) so plant community composition may grade continuously across relatively short distances. The most common historic plant community type of the limestone hills site is dominated by black grama (*Bouteloua eriopoda*), bush muhly (*Muhlenbergia porteri*), and sideoats grama (*Bouteloua curtipendula*). Tobosa (*Pleuraphis mutica*) may be abundant on heavier soils or in areas receiving run-in water. Shrubs and succulents are common, especially on south-facing slopes. South-facing slopes often exhibit low grass cover, even when adjacent north-facing slope are grass-covered. Limestone hills sites often exhibit less shrub cover and more grass cover than adjacent hills sites, indicating the favorable properties of rocky, limestone-derived soils for grasses. The Limestone Hills site is resistant to grass loss compared with other sites in SD-2, perhaps due to the presence of a rough, stony surface that 1) retards sheet flow velocity and erosional soil loss and 2) protects the crowns of grasses from herbivory by livestock. Furthermore, fissures forming in limestone rocks may facilitate infiltration and rock cover retards evaporative water loss relative to other soils.

No systematic studies of communities, states or transitions have been performed in the Limestone Hills site.

State-Transition model: MLRA 42, SD-2, Limestone hills



- 1a. Erosion and loss of soil fertility
- 1b. Soil accumulation or addition

MLRA 42; SD-2; Limestone Hills

Grassland/succulent state



- Black grama, tobosa, some whitethorn and creosotebush
- Few large bare areas
- NW-facing slope
- In background, transition to igneous soils coupled with increases in shrubs.
- Rock outcrop-Torriorthents ass., extremely steep, Caballo Mtns, Sierra Co. NM

Grassland/succulent state



- Creosotebush, ocotillo, threeawns, and some black grama
- Grasses in small patches
- S-facing slope, little utilization
- Rock outcrop-Torriorthents ass., extremely steep, Caballo Mtns, Sierra Co., NM

Grassland/succulent state



- Black and sideoats grama, creosotebush, sotol, beargrass
- Grassy slopes, distant from water sources
- Note reddish igneous soils (Courthouse-Rock outcrop ass.) in background
- Rock outcrop-Torriorthents ass., extremely steep, Sierra Co. NM

Grassland/succulent state



- Creosotebush, ocotillo, some bush muhly and black grama
- SE-facing slope
- Few, scattered, heavily-utilized grass plants
- Rock outcrop-Torriorthents ass., Robledos Mtns, Dona Ana Co. NM

Plant Community Name: Historic Climax Plant Community

Plant Community Sequence Number: 1 Narrative Label: HCPC

Plant Community Narrative:

State Containing Historic Climax Plant Community

Grassland/succulent State:

Black grama is typically dominant and bush muhly, sideoats grama, blue grama (*Bouteloua gracilis*), and curlyleaf muhly (*Muhlenbergia setifolia*) may be subordinates. On heavier soils and in patches receiving run-in water, tobosa may be locally dominant. Succulents are also common plants, especially ocotillo (*Fouquieria splendens*), agaves (*Agave* spp.), and beargrass (*Nolina* spp.), especially at higher elevations within SD-2. Banana yucca (*Yucca bacata*), sotol (*Dasylirion* spp.), creosotebush (*Larrea tridentata*), and mariola (*Parthenium incanum*) are often common. Cool season grasses, such as New Mexico feathergrass (*Hesperostipa neomexicana*) may also be present. Heavy grazing or drought disturbance within this state leads to increasing bare ground and/or increases in the representation of threeawns (*Aristida* spp.), hairy grama (*Bouteloua hirsuta*), fluffgrass (*Dasyochloa pulchella*), and snakeweeds (*Gutierrezia* spp.). Drier, south-facing slopes tend to have a greater representation of succulents and shrubs, more bare ground, and less grass cover even when currently ungrazed. In some cases, the cover of succulents and shrubs may be very high. Abundant rocks and very shallow soils may also result in low grass cover. Steep, northerly-facing slopes often exhibit surprisingly abundant grass growth even where adjacent sites are degraded. With heavy grazing, grasses may be restricted to a few spaces between rocks but may increase with good management and adequate rainfall. Fissuring of limestone rocks seems to promote infiltration compared to igneous rocks, thus imparting a comparatively high degree of resilience to this site. Shrub encroachment that results in competitive influences on grasses is generally not observed, although creosotebush may increase with continuous heavy grazing. Invasions of whitethorn acacia (*Acacia constricta*) as described for the hills site seems not to be as common in limestone hills sites.

Diagnosis: Black grama and/or tobosa are usually dominant in undisturbed settings, especially on north-facing slopes. Grass cover is more or less continuous, with patches of bare ground becoming more common on the drier slopes and with grazing pressure. Shrubs and succulents may be dominant on south-facing slopes. In cases of drought or heavy grazing, grasses may be inconspicuous and found only alongside rocks.

Ground Cover (Average Percent of Surface Area).	
Grasses & Forbs	18
Bare ground	27
Surface gravel	15
Surface cobble and stone	30
Litter (percent)	10
Litter (average depth in cm.)	3

Plant Community Annual Production (by plant type):

Plant Type	Annual Production (lbs/ac)		
	Low	RV	High
Grass/Grasslike	244	403	563
Forb	22	38	52
Tree/Shrub/Vine	59	97	135
Lichen			
Moss			
Microbiotic Crusts			
Totals	325	538	750

Grassland/succulent State Species Composition: Plant species are grouped by annual production **not** by functional groups.

Group	Common Name	Scientific Name	Annual Production in Pounds Per Acre	
			Low	High
1	black grama	<i>Bouteloua eriopoda</i>	161	430
2	bush muhly	<i>Muhlenbergia porteri</i>	81	108
	curlyleaf muhly	<i>Muhlenbergia setifolia</i>		
3	sideoats grama	<i>Bouteloua curtipendula</i>	27	54
	blue grama	<i>Bouteloua gracilis</i>		
4	cane bluestem	<i>Bothriochloa barbinodis</i>	27	54
	plains lovegrass	<i>Eragrostis intermedia</i>		
	green sprangletop	<i>Leptochloa dubia</i>		
	plains bristlegrass	<i>Setaria vulpiseta</i>		
5	Arizona cottontop	<i>Digitaria californica</i>	5	27
	tanglehead	<i>Heteropogon contortus</i>		
	New Mexico feathergrass	<i>Hesperostipa neomexicana</i>		
6	threeawn	<i>Aristida</i>	5	27
	fluffgrass	<i>Dasyochloa pulchella</i>		
	tobosagrass	<i>Pleuraphis mutica</i>		
	slim tridens	<i>Tridens muticus</i>		
7	Grass, annual		5	16
	Grass, perennial		5	16
Group	Common Name	Scientific Name	Annual Production in Pounds Per Acre	
			Low	High
8	ocotillo	<i>Fouquieria splendens</i>	16	43
	sacahuista	<i>Nolina microcarpa</i>		
9	feather dalea	<i>Dalea formosa</i>	5	27
	Apache plume	<i>Fallugia paradoxa</i>		
	Wright lippia	<i>Lippia sp.</i>		
	littleleaf sumac	<i>Rhus microphylla</i>		
10	agave	<i>Agave</i>	5	27
	common sotol	<i>Dasyilirion wheeleri</i>		
	yucca	<i>Yucca</i>		
11	range ratany	<i>Krameria erecta</i>	5	27
	mariola	<i>Parthenium incanum</i>		
12	broom snakeweed	<i>Gutierrezia sarothrae</i>	5	16
13	pricklypear	<i>Opuntia</i>	5	16

<u>Group</u>	<u>Common Name</u>	<u>Scientific Name</u>	Annual Production in Pounds Per Acre	
			<u>Low</u>	<u>High</u>
14	Forb buckwheat blanket flower woolly plantain	<i>Eriogonum</i> <i>Gaillardia pulchella</i> <i>Plantago patagonica</i>	5	27
15	Forb, annual Forb, perennial		27	54

Plant Growth Curve:

Growth Curve Number:

NM2511

Growth Curve Name:

Grassland/succulent State:

Growth Curve Description:

SE-2 Warm season plant community.

Percent Production by Month

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	5	10	10	25	30	15	5	0	0

Additional States:

Transition to bare state (1a): South-facing slopes or flat areas that are easily accessible to livestock, or sites with relatively little soil development, may be susceptible to grass loss and erosion.

Key indicators of approach to transition: Increases in bare ground, evidence of sheet flow including litter dams and loss of soil around rocks, gullies.

Shrub-succulent state: These communities are dominated by succulents and shrubs or may be largely barren with a variable cover of fluffgrass, snakeweeds, and annuals. Distinguishing human-induced loss of grasses from situations in which grass cover is naturally low may be difficult.

Diagnosis: Black grama and other large perennial grasses are scattered, rare, or absent. Gullies may be present.

Transition to grassland/succulent state (1b): If soil loss exposes the stony substrate, then soil would need to accumulate or be added before large perennial grasses could recover. Gullies may need to be blocked and water flow redistributed more evenly. Seeding would likely be required if source populations were unavailable.

Information sources and theoretical background: Communities, states, and transitions are based upon information in the ecological site description and observations by Jim Powell, NRCS, retired, and Brandon Bestelmeyer, Jornada Experimental Range. The speculations regarding the role of surface roughness in providing resistance to grass degradation can and should be empirically verified.

Ecological Site Interpretations

Animal Community:

This site provides habitats which support a resident animal community that is characterized by mule deer, gray fox, ringtail, desert cottontail, Texas antelope squirrel, rock pocket mouse, white throated woodrat, curved billed thrasher, scaled quail, meadowlark, pyrrhuloxia, patch nosed snake and canyon tree frog.

Golden eagles hunt over this site and desert bighorn sheep range into it from adjacent peaks in the San Andres Mountains.

Hydrology Functions:

The runoff curve numbers are determined by field investigations using hydraulic cover conditions and hydrologic soil groups.

Hydrologic Interpretations	
Soil Series	Hydrologic Group
Lozier	D

Recreational Uses:

Suitability for camping and picnicking is fair, limited mostly by topography, rockiness, and stoniness. The site has limited suitability for hiking, "rockhounding" and spelunking. Hunting is fair to good for deer, quail, dove, and small game.

Wood Products:

This site has no significant value for wood production.

Other Products:

This site, at its potential, is suitable for grazing in all seasons of the year, although most of the green forage is produced during summer months. The site is suitable for grazing by all classes of livestock. In order to maintain and improve this site, grazing management that includes a flexible stocking rate is especially important.

Other Information:

Similarity Index	Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month
	Ac/AUM
100 - 76	3.5 – 4.4
75 – 51	4.1 – 6.5
50 – 26	6.2 – 11.0
25 – 0	11.0 - +

Plant Preference by Animal Kind:

	Code	Species Preference	Code
Stems	S	None Selected	N/S
Leaves	L	Preferred	P
Flowers	F	Desirable	D
Fruit/Seeds	F/S	Undesirable	U
Entire Plant	EP	Not Consumed	NC
Underground Parts	UP	Emergency	E
		Toxic	T

Animal Kind: Livestock

Animal Type: Cattle

Common Name	Scientific Name	Plant Part	Forage Preferences											
			J	F	M	A	M	J	J	A	S	O	N	D
black grama	<i>Bouteloua eriopoda</i>	EP	P	P	P	D	D	D	D	D	D	D	P	P
bush muhly	<i>Muhlenbergia porteri</i>	EP	P	P	P	P	P	P	P	P	P	P	P	P
Metcalfé muhly	<i>Muhlenbergia rigida</i>	EP	D	D	D	D	D	P	P	P	P	D	D	D
New Mexico feathergrass	<i>Hesperostipa neomexicana</i>	L/S	NC	NC	P	P	P	NC	NC	NC	NC	NC	NC	NC
blue grama	<i>Bouteloua gracilis</i>	EP	D	D	D	D	D	P	P	P	P	P	D	D
sideoats grama	<i>Bouteloua curtipendula</i>	EP	P	P	P	P	P	P	P	P	P	P	P	P
plains bristlegrass	<i>Setaria vulpiseta</i>	EP	D	D	D	D	D	P	P	P	P	D	D	D
soaptree yucca	<i>Yucca elata</i>	F	N/S	N/S	N/S	N/S	P	P	N/S	N/S	N/S	N/S	N/S	N/S

Supporting Information

Associated Sites:

<u>Site Name</u>	<u>Site ID</u>	<u>Site Narrative</u>
Gravelly	<u>R042XB035NM</u>	
Hills	<u>R042XB027NM</u>	

Similiar Sites:

<u>Site Name</u>	<u>Site ID</u>	<u>Site Narrative</u>
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State Correlation:

This site has been correlated with the following states: Texas

Inventory Data References:

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
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Type Locality:

Relationship to Other Established Classifications:

Other References:

Data collection for this site was done in conjunction with the progressive soil surveys within the Southern Desertic Basins, Plains and Mountains, Major Land Resource Areas of New Mexico. This site has been mapped and correlated with soils in the following soil surveys. Sierra County Dona Ana County Grant County Hidalgo County Luna County Otero County

Characteristic Soils Are:

Lozier stony loam	
Lozier gravelly loam	

Other Soils included are:

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Site Description Approval:

<u>Author</u>	<u>Date</u>	<u>Approval</u>	<u>Date</u>
Don Sylvester	07/12/1979	Don Sylvester	07/12/1979

Site Description Revision:

<u>Author</u>	<u>Date</u>	<u>Approval</u>	<u>Date</u>
Dr. Brandon Bestelmeyer	02/27/03	George Chavez	03/04/03
George Chavez	02/27/03		